COMMERCIAL FISHPONDS - 397
DESIGN AND INSTALLATION

DESIGN CRITERIA

The site must be protected from flooding, sedimentation, and contamination. The soils within the pond area, as well as those in the contributing drainage area, must be checked for residues of pesticides and other harmful chemicals if there is a possibility of contamination.

Commercial fishponds may be: (1) embankment ponds that intercept and store surface runoff water, or (2) excavated ponds that are completely enclosed by an embankment around the outer perimeter and are filled by pumping.

Embankment ponds. Earthfill dams and embankments around excavated ponds shall meet or exceed the requirements specified for Pond - 378 with the following additional requirements:

1. The minimum elevation of the top of the settled embankment shall be increased to allow for wave action. This increased allowance shall be as specified in table 1.

Table 1.-Wave height

Max. fetch* length		Wave height	
m	*ft*	*m*	*ft*
< 100	< 330	0.15	0.5
100 - 200	330 - 660	0.31	1.0
200 - 400	660 - 1,320	0.46	1.5
400 - 1,600	1,320 - 5,280	0.61	2.0

*Fetch is defined as the longest uninterrupted distance traveled by wind or wave.

2. The minimum top width of the embankment shall be 4.3 m (14 ft) and 6.1 m (20 ft), respectively, where it is to be used as a one-lane or two-lane road for management purposes and is nonpublic.

3. Interior embankments constructed for division of water or to direct water flow for circulation shall have adequate cross section to provide for stability and function for its intended purpose.

Excavated ponds. Ponds established by excavating and constructing an embankment around their outer perimeter that excludes outside runoff shall have either an emergency spillway with a bottom width of at least 3.0 m (10 ft) or have an overflow pipe installed with sufficient capacity to remove a 10-yr/24-hr direct rainfall amount or be at least 200 mm (8 in) in diameter, whichever is larger.

The pond bottom should be sloped to the outlet at a gradient of at least 0.06 m per 30 m (0.2 ft per 100 ft).

Orientation. Rectangular ponds shall be positioned as nearly as possible as follows:

4.0 ha (10 acres) or less — long axis in the direction of prevailing wind. More than 4.0 ha (10 acres) — long axis perpendicular to the direction of prevailing wind.

Water supply. Wells are the most desirable source of water, but any available source may be used if the quality and quantity are adequate. If water is pumped from rivers and streams or other sources where undesirable fish may be introduced, filters must be installed on the intake.

The minimum incoming water supply for adequate maintenance is considered to be 0.4 to 0.6 L/s/ha (15 to 25 gal/min/acre). However, evaporation rates, fish-loading densities, and species requirements will be used in establishing specific rates. Flow shall be measured during periods of lowest flow. The pumping and pipeline facilities shall be located to best serve the pond, taking into account accessibility for maintenance and repair; protection from overflow and flood hazards; connections to power lines or fuel sources; and future expansion. Water entering the pond shall be aerated to increase dissolved oxygen and dissipate harmful gases if needed. This can be accomplished by falling, splashing, spraying, etc. Also, incoming water shall be as far away from outlet drain as possible so that "short circuits" will be avoided.

Pipes and conduits. Pump discharge through levees shall be installed above expected high water, and provisions shall be made to prevent pump and motor vibrations being transmitted to discharge conduits.

Depth. The water depths for various species are as shown in table 2. These values are applicable to warm climates. Additional depth is required in cold climates to prevent or minimize winterkill.

Table 2.-Water depth for various species

Species	Most desirable	Minimum
	m(ft)	*m(ft)*
Channel catfish	1.2 (4) to 1.8 (6)	[1]0.76 (2.5)
Crawfish	0.4 (1.5) to 0.6 (2)	0.3 (1)
Minnows, other baitfish	1.2 (4) to 1.8 (6)	0.9 (3)
Trout	[2]0.9 (3) to 1.5 (5)	0.9 (3)

[1]Ponds used for cage culture shall have a minimum depth of 1.5 m (5 ft) where cages are located. (Minimum clearance below the cage is 0.3 m (1 ft) but as much as 0.9 m (3 ft) is preferred.)

[2]Ponds are supplied by a constant flow of water. If pond is filled only during rainy seasons, a depth of 3 to 3.7 m (10 to 12 ft) over one-fourth or more of the pond area is recommended.

Drains. The pond must have facilities for complete as well as partial drainage. Turn-down pipes, quick-release valves, bottom-water release sleeves, or other devices for water level control and pond management are to be included in the construction of the drain facility as appropriate. Pond-(378) shall be followed for conduit design and installation of anti-seep collars.

Pond bottom. Where fish are harvested by seining, the pond bottom shall be smoothed and free of all stumps, trees, roots, and other debris. Existing channels and depressions in the pond area shall be filled and smoothed

For ponds where crawfish are harvested by trapping, complete clearing and removal of trees, stumps, and other vegetation are not necessary unless required by state or local ordinances.

Access and safety. Provisions shall be made for access to the site as well as access for operation and maintenance. Ramps shall be located as necessary to accommodate aeration and harvesting equipment. The maximum grade for equipment access shall be 20 percent (5:1 slope). Generally, level areas or restraining barriers shall be provided to protect pumps, motors, fuel tanks, and utility poles from vehicular traffic. Appropriate safety features and devices shall be installed or made available close by to aid people who fall into the pond and to prevent such accidents.

Protection. A protective cover of vegetation shall be established on all exposed soil surfaces that have been disturbed. If soil or climatic conditions preclude the use of vegetation, other protection methods may be used. Adequate provisions must be made to protect earth surfaces from wave erosion and turbulent water at pipe inlets and outlets. Fences shall be installed as necessary to exclude livestock and unwanted traffic. Road surfaces shall be treated if necessary to prevent vehicles from cutting deep ruts or sliding into the pond. Dams and levees shall be crowned to provide positive drainage.

Operation and maintenance. A plan for operation and maintenance shall be prepared for use by those responsible for the system. This plan shall provide for inspection, operation, and maintenance of vegetation, pipes, valves, spillways, roads, and other parts of the system.

Plans and specifications. Plans and specifications for constructing commercial fishponds shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.